**LPDES PERMIT NO. LA0051799, AI No. 3245**

**LPDES STATEMENT OF BASIS**
FOR THE DRAFT LOUISIANA POLLUTANT DISCHARGE ELIMINATION SYSTEM (LPDES) PERMIT TO DISCHARGE TO WATERS OF LOUISIANA

**Company/Facility Name:** Verenium Biofuels Louisiana, LLC
P. O. Box 389
Jennings, LA 70546

**Issuing Office:** Louisiana Department of Environmental Quality (LDEQ)
Office of Environmental Services
P. O. Box 4313
Baton Rouge, LA 70821-4313

**Prepared By:** Gene Jarreau
Level 1 Industrial Water Permits Section
Water Permits Division
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**Date Prepared:** February 9, 2009

## I. Permit Action/Status:

Reason For Permit Action:

The Department of Environmental Quality proposes to reissue a LPDES permit for a 5-year term following regulations promulgated at LAC 33:IX.2711/40 CFR 122.46.

In order to ease the transition from NPDES to LPDES permits, dual regulatory references are provided where applicable. The LAC references are the legal references while the 40 CFR references are presented for informational purposes only. In most cases, LAC language is based on and is identical to the 40 CFR language. 40 CFR Parts 401, 405-415, and 417-471 have been adopted by reference at LAC 33:IX.4903 and will not have dual references. In addition, state standards (LAC 33:IX Chapter 11) will not have dual references.

LAC 33:IX Citations: Unless otherwise stated, citations to LAC 33:IX refer to promulgated regulations listed at Louisiana Administrative Code, Title 33, Part IX.

40 CFR Citations: Unless otherwise stated, citations to 40 CFR refer to promulgated regulations listed at Title 40, Code of Federal Regulations in accordance with the dates specified at LAC 33:IX.4901, 4903, and 2301.F.

A. NPDES permit - NPDES permit effective date: August 3, 1983
NPDES permit expiration date: August 2, 1988
EPA has not retained enforcement authority.

B. LPDES permits - Individual LPDES Permit LA0051799
LPDES permit effective date: October 1, 2003
LPDES permit expiration date: September 30, 2008

General LPDES Permit Authorization LAG670100
LPDES permit authorization effective date: May 5, 2008
LPDES permit authorization expiration date: January 31, 2013

General LPDES Permit Authorization LAR10D999
LPDES permit authorization effective date: April 5, 2007
LPDES permit authorization expiration date: September 30, 2009

General LPDES Permit Authorization LAR05N778
LPDES permit authorization effective date: February 9, 2007
LPDES permit authorization expiration date: April 30, 2011

C. Application received on April 3, 2008, and an updated application was received on November 14, 2008.

## II. Facility Information:

A. Location – 11107 Campbell Wells Road, Jennings, Jefferson Davis Parish
Latitude 30°11'59", Longitude 92°35'59"

B. Applicant Activity -

Verenium Biofuels Louisiana, LLC is an existing fuel grade ethanol plant. There are two separate plants located at this site. The Pilot Plant is used for research and development purposes only, as an "ethanol-equivalent" production facility with a capacity of approximately 50 thousand gallons per year. The Demonstration Plant is a scaled-up version of the Pilot Plant, and is utilized to demonstrate the technology prior to launching a full-scale commercial production operation. The Demonstration Plant has an expected fuel-grade ethanol production capacity of approximately 1.4 million gallons per year. Sugarcane bagasse is the primary feedstock, with plans to utilize other cellulose-rich materials as a biomass feedstock (such as wood chips).

Both plants use a fermentation process to produce ethanol from biomass feedstock. The process starts by washing the biomass feedstock and sending the stream to a hydrolyser. The hydrolyser consists of a single-stage dilute acid hydrolysis process, which utilizes sulfuric acid to produce sugars from the hemicellulose and cellulose fractions of the biomass feedstock. The resulting stream consists of glucose that is derived from the cellulose fraction, and a variety of pentoses and hexoses derived from the hemicellulose fraction. The fermented mash from both fermentation processes is transferred to a tank called a "beer-well" to produce a "beer" containing about 3-4 % ethanol by weight. The "beer" is passed through a distillation system to separate the ethanol from the solids and most of the water, producing a vapor stream that is approximately 92% ethanol vapor and 8% water vapor by weight. A molecular sieve system is utilized to remove the balance of the water from the ethanol vapor stream, and includes several units which alternate between absorption and regeneration modes. The purified ethanol vapor is condensed and denatured with gasoline, resulting in a product that contains 95% ethanol and 5% gasoline by weight.

The source of water supply for the facility is from two fresh water wells. Well No. 901 supplies water for the Demonstration Plant (estimated flow of 1,008,000 gallons per day (GPD)). Well No. 902 supplies water for the Pilot Plant (estimated flow of 36,000 GPD).

No sanitary wastewater is discharged to surface waters. The sanitary wastewater septic treatment systems utilize spray irrigation discharge processes, so there are no sanitary wastewater discharge outfalls. Stormwater discharges are covered by this permit and the Multi-Sector Storm Water General Permit authorization LAR05N778.

Normally, Outfall 001 consists of treated process wastewater, process area stormwater runoff, and boiler blowdown. Alternatively, Outfall 001 may include treated hydrostatic test and vessel testing wastewater (that does not meet the effluent limitations of General LPDES Permit authorization LAG670100), bagasse stockpile stormwater runoff, cooling tower blowdown, and utility water conditioning effluent. Other miscellaneous wastewaters generated include firewater overflow/flush, utility wash water, clean-in-place water, laboratory sinks, bagasse stockpile leachate, and pump seal drains.
For Outfall 001, the treatment methods will alternate, due to the variable wastewater generation volumes to be treated.

Normally, Outfall 005 consists of untreated cooling tower blowdown, utility water conditioning effluent, and process and non-process area stormwater runoff. Alternatively, Outfall 005 may include untreated boiler blowdown.

C. Technology Basis –

(40 CFR Chapter 1, Subchapter N/Parts 401, 405-415, and 417-471 have been adopted by reference at LAC 33:IX.4903)
In recent years, fuel grade ethanol production has been classified under SIC Code 2869 – Industrial Organic Chemicals, NEC. Organic chemical manufacturing is generally covered under the Organic Chemicals, Plastics, and Synthetic Fibers (OCPSF) Guidelines at 40 CFR 414. However, in accordance with the General Provisions located at 40 CFR 414, Subpart A, the provisions of those guidelines do not apply to any process wastewater discharges from the manufacture of organic chemical compounds solely by the extraction from plant and animal raw materials. Since the discharges from Verenium Biofuels Louisiana, LLC would fall under this category, the OCPSF Guidelines are not applicable. See Section VI below for justification of permit limitations.

Other sources of technology based limits:
Current Permit (effective October 1, 2003)
LDEQ Stormwater Guidance, letter dated 6/17/87, from J. Dale Givens (LDEQ) to Myron Knudson (US EPA Region 6).
Best Professional Judgment (BPJ)
Similar Facility – Permit LA0123960
Light Commercial Facilities General Permit LAG480000

D. Fee Rate -

i) Fee Rating Facility Type: Minor
ii) Complexity Type: II (The complexity type has been assigned on a BPJ basis, due to the type of processes that take place at this facility and similar facilities.)
iii) Wastewater Type: II
iv) SIC Code: 2869

E. Continuous Facility Effluent Flow – 1.037 MGD (Million Gallons per Day)

**III. Receiving Waters:** Mermentau River

A. River Basin: Mermentau River, Subsegment No. 050401

B. Designated Uses: The designated uses are primary contact recreation, secondary contact recreation, fish and wildlife propagation, and agriculture.
C. TSS (15%), mg/L: 8.5
D. Average Hardness, mg/L $CaCO_3$: 45.7
E. Critical Flow, cfs: 68.52

Information based on the following: Recommendation(s) from the Engineering Section. No Harmonic Mean Flow or Mixing Zone Fraction was given/needed for this water quality scan. Hardness and (15%) TSS data come from ambient site number 3 (Mermentau River at the bridge on US Highway 190 between Mermentau and Silverwood, Louisiana). This information was presented in a memorandum from Todd Franklin to permit writer, dated January 22, 2009 (See Appendix A).

## IV. Outfall Information:

Outfall 001

A. Type of wastewater – the continuous discharge of treated process wastewater, process area stormwater runoff, boiler blowdown, hydrostatic test and vessel testing wastewater, bagasse stockpile stormwater runoff, cooling tower blowdown, and utility water conditioning effluent.

B. Location – at the point of discharge from the wastewater treatment facilities, located on the east side of the plant site, prior to combining with waters of the state. (Latitude 30°11'53", Longitude 92°35'41")

C. Treatment – Aeration, Clarification, Activated Carbon Filtration, Equalization, Filtration, Rotary Vacuum Filtration, Ultra Filtration; Reverse Osmosis

D. Flow – Continuous, Averages approximately 0.927 MGD (with normal discharge types)

E. Receiving waters – Mermentau River via pipe.

F. Basin and Subsegment – Mermentau River Basin, Subsegment 050401

Outfall 005

A. Type of wastewater – the continuous discharge of process and non-process area stormwater runoff, boiler blowdown, cooling tower blowdown, and utility water conditioning effluent.

B. Location – at the point of discharge located on the southeast side of the Demonstration Plant, prior to combining with waters of the state. (Latitude 30°12'00", Longitude 92°35'46")

C. Treatment – None

D. Flow – Continuous, Averages approximately 0.110 MGD (with normal discharge types)

E. Receiving waters – Mermentau River via open drainage ditch.

F. Basin and Subsegment – Mermentau River Basin, Subsegment 050401

## V. Proposed Changes from Previous Permit:

Summary of proposed changes from the current LPDES permit:

Outfall 001 – Add "boiler blowdown, hydrostatic test and vessel testing wastewater, bagasse stockpile stormwater runoff, cooling tower blowdown, and utility water conditioning effluent" as discharge types (in the outfall description). Delete "sanitary wastewater from Internal Outfall 101" as a discharge type in the outfall description, for sanitary wastewater is no longer discharged through this outfall or to surface waters. "Flow measurement frequency" will be changed from "1/week" to "1/day", and "sample type" will be changed from "estimate" to "measure", for this outfall's actual flow will significantly increase and a flow meter will be added to this outfall. "CBOD – Summer, CBOD – Winter, and Ammonia-N daily maximums" will be deleted, for they are not in the TMDLs. (Technical mistakes or mistaken interpretations of the TMDLs were made in issuing the previous permit.) "TSS discharge limitations" will be changed from "350 lbs/day & 30 mg/L monthly averages" and "525 lbs/day & 45 mg/L daily maximums" to a "232 lbs/day monthly average" and a "696 lbs/day daily maximum", for sanitary wastewater is no longer a discharge type in this outfall, and this outfall's treatment methods and discharge types will significantly change (see above). (Material and substantial alterations and additions to the permitted facility occurred after previous permit issuance.) "pH measurement frequency" will be changed

from "1/week" to "3/week", for this outfall's actual flow will significantly increase. Add "Oil and Grease" with a "15 mg/L daily maximum" and "1/month grab monitoring requirements", due to the outfall's additional discharge types proposed (see above). Add "TOC" with a "387 lbs/day daily maximum" and "1/month 24-hour composite monitoring requirements", due to the outfall's additional discharge types proposed (see above). Add "Total Residual Chlorine" with a "0.2 mg/L daily maximum" and "1/month grab monitoring requirements", due to the outfall's additional blowdown discharge types proposed (see above) and for their water treatment chemicals containing chlorine.

Internal Outfall 101 – Delete this outfall, for the sanitary wastewater treatment systems now utilize spray irrigation discharge processes, so there are no longer any sanitary wastewater discharge outfalls.

Outfalls 002, 003, and 004 – Delete these low contamination potential stormwater runoff outfalls, for their coverage is being moved to the Multi-Sector Storm Water General Permit authorization LAR05N778.

Outfall 005 – Change the latitude/longitude of discharge from "Latitude 30°12'00", Longitude 92°35'48"" to "Latitude 30°12'00", Longitude 92°35'46"". Change the discharge types (in the outfall description) from "low contamination potential stormwater runoff" to "process and non-process area stormwater runoff, boiler blowdown, cooling tower blowdown, and utility water conditioning effluent". "Flow measurement frequency" will be changed from "1/month" to "1/week", for this outfall's actual flow will increase. "pH measurement frequency" will be changed from "1/month" to "1/week", for this outfall's actual flow will increase. Add "Total Residual Chlorine" with a "0.2 mg/L daily maximum" and "1/month grab monitoring requirements", due to the outfall's additional blowdown discharge types proposed (see above) and for their water treatment chemicals containing chlorine.

## VI. Permit Limit Rationale:

The following section sets forth the principal facts and the significant factual, legal, methodological, and policy questions considered in preparing the draft permit. Development and calculation of permit limits are detailed in the Permit Limit Rationale section below.

A. **Outfall 001** – the continuous discharge of treated process wastewater, process area stormwater runoff, boiler blowdown, hydrostatic test and vessel testing wastewater, bagasse stockpile stormwater runoff, cooling tower blowdown, and utility water conditioning effluent.

These discharges shall be limited and monitored by the permittee according to the following schedule:

| Parameter | Proposed Discharge Limitations | | Measurement Frequency | Sample Type |
|---|---|---|---|---|
| | Monthly Average | Daily Maximum | | |
| Flow | Report (MGD) | Report (MGD) | 1/day | Measure |
| CBOD Summer | 117 lbs/day | NA | 1/week | 24-hour Composite |
| CBOD Winter | 234 lbs/day | NA | 1/week | 24-hour Composite |
| Ammonia Nitrogen | 117 lbs/day | NA | 1/week | 24-hour Composite |
| Oil & Grease | NA | 15 mg/L | 1/month | Grab |
| TOC | NA | 387 lbs/day | 1/month | 24-hour Composite |
| TSS | 232 lbs/day | 696 lbs/day | 1/week | 24-hour Composite |
| TRC | NA | 0.2 mg/L | 1/month | Grab |
| pH | 6.0 – 9.0 Minimum - Maximum (standard units) | | 3/week | Grab |

## Site-Specific Considerations

**Flow** – Established in accordance with LAC 33:IX.2707.I.1.b.

**CBOD – Summer, CBOD – Winter, and Ammonia-Nitrogen** – The monthly average effluent limitations and monitoring requirements are established in accordance with TMDL waste load allocations, and will remain in the permit due to the phosphorus, nitrogen, ammonia, and organic enrichment/low dissolved oxygen impairments addressed in the Louisiana Water Quality Management Plan-Volume 8 (January 26, 2009), the Mermentau River Watershed TMDL to address Dissolved Oxygen and Nutrients including WLAs for two treatment facilities (February 25, 2000), and the Mermentau River TMDL for Ammonia (May 2, 2002).

**Oil & Grease** – Effluent limitations and monitoring requirements are established in accordance with BPJ, LDEQ Stormwater Guidance [letter dated 6/17/87 from J. Dale Givens (LDEQ) to Myron Knudson (US EPA Region 6)], a Similar Facility – Permit LA0123960, and the Light Commercial Facilities General Permit LAG480000.

**TOC** - Effluent limitations and monitoring requirements are established in accordance with this outfall's proposed average flow, BPJ, LDEQ Stormwater Guidance [letter dated 6/17/87 from J. Dale Givens (LDEQ) to Myron Knudson (US EPA Region 6)], a Similar Facility – Permit LA0123960, and the Light Commercial Facilities General Permit LAG480000.

Calculation for TOC daily maximum effluent limitation:
(50 mg/L)(0.927 MGD)(8.34 lbs/gallon) = 387 lbs/day

**TSS** - Effluent limitations and monitoring requirements are established in accordance with this outfall's proposed average flow, BPJ, and the Light Commercial Facilities General Permit LAG480000.

Calculation for TSS monthly average effluent limitation:
(30 mg/L)(0.927 MGD)(8.34 lbs/gallon) = 232 lbs/day

Calculation for TSS daily maximum effluent limitation:
(90 mg/L)(0.927 MGD)(8.34 lbs/gallon) = 696 lbs/day

**TRC (Total Residual Chlorine)** - Effluent limitations and monitoring requirements are established in accordance with BPJ and the Light Commercial Facilities General Permit LAG480000.

**pH** - Effluent limitations and monitoring requirements are established in accordance with LAC 33:IX.1113.C.1, BPJ, LDEQ Stormwater Guidance [letter dated 6/17/87 from J. Dale Givens (LDEQ) to Myron Knudson (US EPA Region 6)], a Similar Facility – Permit LA0123960, and the Light Commercial Facilities General Permit LAG480000.

B. **Outfall 005** – the continuous discharge of process and non-process area stormwater runoff, boiler blowdown, cooling tower blowdown, and utility water conditioning effluent.

These discharges shall be limited and monitored by the permittee according to the following schedule:

| Parameter | Proposed Discharge Limitations | | Measurement Frequency | Sample Type |
|---|---|---|---|---|
| | Monthly Average | Daily Maximum | | |
| Flow | Report (MGD) | Report (MGD) | 1/week | Estimate |
| Oil & Grease | NA | 15 mg/L | 1/month | Grab |
| TOC | NA | 50 mg/L | 1/month | Grab |
| TRC | NA | 0.2 mg/L | 1/month | Grab |
| pH | 6.0 – 9.0 Minimum - Maximum (standard units) | | 1/week | Grab |

## Site-Specific Considerations

**Flow** – Established in accordance with LAC 33:IX.2707.I.1.b.

**Oil & Grease** – Effluent limitations and monitoring requirements are established in accordance with BPJ, LDEQ Stormwater Guidance [letter dated 6/17/87 from J. Dale Givens (LDEQ) to Myron Knudson (US EPA Region 6)], a Similar Facility – Permit LA0123960, and the Light Commercial Facilities General Permit LAG480000.

**TOC** - Effluent limitations and monitoring requirements are established in accordance with BPJ, LDEQ Stormwater Guidance [letter dated 6/17/87 from J. Dale Givens (LDEQ) to Myron Knudson (US EPA Region 6)], a Similar Facility – Permit LA0123960, and the Light Commercial Facilities General Permit LAG480000.

**TRC (Total Residual Chlorine)** - Effluent limitations and monitoring requirements are established in accordance with BPJ and the Light Commercial Facilities General Permit LAG480000.

**pH** - Effluent limitations and monitoring requirements are established in accordance with LAC 33:IX.1113.C.1, BPJ, LDEQ Stormwater Guidance [letter dated 6/17/87 from J. Dale Givens (LDEQ) to Myron Knudson (US EPA Region 6)], a Similar Facility – Permit LA0123960, and the Light Commercial Facilities General Permit LAG480000.

## VII. Water Quality-Based Effluent Limitations:

Specific analytical results from the permittee's application were screened against state water quality numerical standard based limits by following guidance procedures established in the Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards, Water Quality Management Plan, Volume 3, Version 6, LDEQ Office of Environmental Services, April 16, 2008. Calculations and results are given in Appendix B-1, and documentation is given in Appendix B-2.

No pollutants received water quality based effluent limits, based upon this specific screen. Minimum quantification levels (MQL's) for state water quality numerical standards-based effluent imitations are set at the values listed in the Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards, Water Quality Management Plan, Volume 3, Version 6, LDEQ Office of Environmental Services, April 16, 2008.

## VIII. TMDL Waterbodies:

Subsegment 050401, Mermentau River – Origin to Lake Arthur, is not listed on LDEQ's Final 2006 303(d) list as impaired. However, subsegment 050401 was previously listed as impaired for phosphorus, nitrogen, ammonia, organic enrichment / low dissolved oxygen, and fipronil, for which the below TMDLs have been developed. The Department of Environmental Quality (DEQ) reserves the right to impose more stringent discharge limitations and/or additional restrictions in the future to maintain the water quality integrity and the designated uses of the receiving waterbodies based upon additional TMDLs and/or water quality studies. The DEQ also reserves the right to modify or revoke and reissue this permit based upon any changes to established TMDLs for this discharge, or to accommodate for pollutant trading provisions in approved TMDL watersheds as necessary to achieve compliance with water quality standards.

The following TMDLs have been established for subsegment 050401:
Mermentau River Watershed TMDL to address Dissolved Oxygen and Nutrients including WLAs for two treatment facilities (February 25, 2000)
For phosphorus, nitrogen, and organic enrichment / low dissolved oxygen:
This facility was one of the two treatment facilities assigned waste load allocations (WLAs) in this TMDL. The TMDL modeled conditions during the summer (March through November) and the winter (December through February), and assigned seasonal WLAs for this facility. The results of the summer projection model showed the dissolved oxygen water quality standard in the Mermentau River (Subsegment 050401) can be maintained with the imposition of 10 mg/L CBOD and 10 mg/L Ammonia-Nitrogen limits on this facility. The results of the winter projection model showed the dissolved oxygen water quality standard in the Mermentau River (Subsegment 050401) can be maintained with the imposition of 20

mg/L CBOD and 10 mg/L Ammonia-Nitrogen limits on this facility.
At the time they were done, the models used 125% of the previous facility's flow (1.40 MGD) as the modeled flow (1.75 MGD). Based on these flow allocations, CBOD – Summer, CBOD – Winter, and Ammonia-Nitrogen lbs/day monthly average effluent limitations and monitoring requirements for Outfall 001 will remain in the permit.
This waterbody was also listed as impaired due to nutrients. This TMDL establishes load limitations for oxygen-demanding substances and goals for reduction of these pollutants. LDEQ's position, as supported by the ruling in the lawsuit regarding water quality criteria for nutrients (Sierra Club v. Givens, 710 So.2d 249 (La. App. 1st Cir. 1997), writ denied, 705 So.2d 1106 (La. 1998)), is that when oxygen-demanding substances are controlled and limited in order to ensure that the dissolved oxygen criterion is supported, nutrients are also controlled and limited. The implementation of this TMDL through wastewater discharge permits and implementation of best management practices (BMPs) to control and reduce runoff of soil and oxygen-demanding pollutants from nonpoint sources in the watershed will also control and reduce the nutrient loading from those sources.
As per the February 29, 2000 Delist (Federal Register Notice: Vol. 65, Num. 173, pages 54032-54034, September 6, 2000), assessment of new data and information showed this segment is meeting water quality standards for Phosphorus. Therefore, requirements for Total Phosphorus will not be placed in this permit.

Mermentau River TMDL for Ammonia (May 2, 2002)
For ammonia:
That Dissolved Oxygen (DO) directly correlates with overall nutrient impact is a well-established biological and ecological principle. Thus, when the LDEQ maintains and protects DO, the LDEQ is in effect also limiting and controlling nutrient concentrations and impacts. DO serves as an indicator for which a water quality criterion exists and is used in the assessment of use support. Therefore, in this TMDL, the ammonia loading required to maintain the dissolved oxygen standard (see the Mermentau River Watershed TMDL to address Dissolved Oxygen and Nutrients including WLAs for two treatment facilities (February 25, 2000) section above) serves as the Ammonia TMDL.

This TMDL assigned the same seasonal WLAs for this facility to the Mermentau River, and also included CBOD – Summer, CBOD – Winter, and Ammonia-Nitrogen effluent limitations expressed in lbs/day. The results of the summer projection model showed the dissolved oxygen water quality standard in the Mermentau River (Subsegment 050401) can be maintained with the imposition of 117 lbs/day CBOD and 117 lbs/day Ammonia-Nitrogen limits on this facility. The results of the winter projection model showed the dissolved oxygen water quality standard in the Mermentau River (Subsegment 050401) can be maintained with the imposition of 234 lbs/day CBOD and 117 lbs/day Ammonia-Nitrogen limits on this facility.

TMDL for the Pesticide Fipronil in the Mermentau Basin (March 21, 2002)
For fipronil:
As per this TMDL, there are no known point sources for fipronil in the Mermentau River Basin. Effluent from these point sources is not expected to contain fipronil because its use is limited to rice farming. Therefore, concentrations of fipronil in their effluents are not expected, and would be considered an enforcement issue and dealt with accordingly.
For this facility, fipronil was not determined to be discharged at levels which would cause, have the reasonable potential to cause or contribute to an excursion above any present state water quality standard.

Federal regulations under 40 CFR 130.7 require the State to incorporate all Final TMDLs into its current Water Quality Management Plan (WQMP). The State is also required to ensure consistency with the WQMP requirements approved by EPA under Section 208(b) of the Clean Water Act (CWA), as cited under LAC 33.IX.2707.D.6. Since the requirements established in the Mermentau River Watershed TMDL to address Dissolved Oxygen and Nutrients including WLAs for two treatment facilities (February 25, 2000) are water quality-based effluent limitations that are part of the current Louisiana Water Quality Management Plan-Volume 8 (January 26, 2009), the TMDL waste load allocations must remain in the permit.

## IX. Compliance History/DMR Review:

A compliance history/DMR review was done covering the period of January 17, 2006 to January 17, 2009.

A. DMR Excursions Reported

In June 2007, the daily maximum for TOC was 70.4 mg/L (limit is 50 mg/L) for Outfall 003. The explanation of this violation stated this was probably a result of demolition activities occurring near this outfall, involving a number of old grain silos containing residual materials used by the previous owners. The permittee also stated they will continue to monitor the conditions of the stormwater associated with this outfall.

In August 2007, the daily maximum for TOC was 171 mg/L (limit is 50 mg/L) for Outfall 004. The explanation of this violation stated this was probably due to construction activities occurring at the nearby bagasse stockpile area. The permittee also stated greater protections have been put in place, and the levels of TOC have dropped.

In July 2008, the daily maximum for TSS was 74 mg/L (limit is 45 mg/L) and the monthly average for TSS was 48 mg/L (limit is 30 mg/L) for Outfall 001. The explanation of this violation stated treated process wastewater was sent to on-site

storage for the first three weeks of this month. This outfall had no discharge during these three weeks. Discharge did not begin until the fourth week of this month.

B. Inspections

The last water permit routine LDEQ Compliance Evaluation Inspection (CEI) was performed on December 14, 2006. The status was rated as compliant, for no areas of concern were noted during the inspection.

C. Compliance History

There are no open, appealed, or pending enforcement actions as of January 17, 2009.

Please be aware that the Department has the authority to reduce monitoring frequencies when a permittee demonstrated two or more consecutive years of permit compliance. Monitoring frequencies established in LPDES permits are based on a number of factors, including but not limited to, the size of the discharge, the type of wastewater being discharged, the specific operations at the facility, past compliance history, similar facilities, and best professional judgment of the reviewer. We encourage and invite each permittee to institute positive measures to ensure continued compliance with the LPDES permit, thereby qualifying for reduced monitoring frequencies upon permit reissuance. If the Department can be of any assistance in this area, please do not hesitate to contact us. As a reminder, the Department will also consider an increase in monitoring frequency upon permit reissuance when the permittee demonstrates continued non-compliance.

## X. "IT" Questions – Applicant's Responses:

Verenium Biofuels Louisiana, LLC is a minor facility, therefore, IT Questions were not required to be submitted.

## XI. Endangered Species:

The receiving waterbody, Subsegment 050401 of the Mermentau River Basin, has not been identified by the U.S. Fish and Wildlife Service (FWS) as habitat for any species, which are listed federally as a threatened species. Also, this type of discharge is not listed in Section II.2 of the Implementation Strategy as requiring consultation with the U.S. Fish and Wildlife Service (FWS). This strategy was submitted with a letter dated November 17, 2008 from Rieck (FWS) to Nolan (LDEQ). Therefore, in accordance with the Memorandum of Understanding between the LDEQ and the FWS, no further informal (Section 7, Endangered Species Act) consultation is required. The effluent limitations established in the permit ensure protection of aquatic life and maintenance of the receiving water as aquatic habitat. Therefore, the issuance of the LPDES permit is not likely to have an adverse effect on any endangered or candidate species, or the critical habitat.

**XII. Historic Sites:**

The discharge is from an existing facility location, but does include an expansion on undisturbed soils. The consultant for Verenium Biofuels Louisiana, LLC consulted with the State Historic Preservation Officer (SHPO) in a letter dated December 3, 2008, to determine whether construction-related activities could potentially affect sites or properties on or eligible for listing on the National Register of Historic Places. The SHPO provided a response on December 31, 2008, indicating that no known archaeological sites or historic properties will be affected by Verenium Biofuels Louisiana, LLC.

**XIII. Tentative Determination:**

On the basis of preliminary staff review, the Louisiana Department of Environmental Quality has made a tentative determination to re-issue a permit for the discharges described in the application.

**XIV. Variances:**

No requests for variances have been received by this Office.

**XV. Public Notices:**

Upon publication of the public notice, a public comment period shall begin on the date of publication and last for at least 30 days thereafter. During this period, any interested persons may submit written comments on the draft permit and may request a public hearing to clarify issues involved in the permit decision at this Office's address on the first page of the statement of basis. A request for a public hearing shall be in writing and shall state the nature of the issues proposed to be raised in the hearing.

Public Notice published in:
Local Newspaper of general circulation;
Office of Environmental Services Public Notice Mailing List.

**XVI. Stormwater Pollution Prevention Plan (SWP3) Requirement:**

In accordance with LAC 33:IX.2707.I.3 and LAC 33:IX.2707.I.4 [40 CFR 122.44(I)(3) and (4)], a Part II condition is proposed for applicability to all storm water discharges from the facility, either through permitted outfalls or through outfalls which are not listed in the permit or as sheet flow. **For first time permit issuance,** the Part II condition requires a Storm Water Pollution Prevention Plan (SWP3) within six (6) months of the effective date of the

final permit. **For renewal permit issuance,** the Part II condition requires that the Storm Water Pollution Prevention Plan (SWP3) be reviewed and updated, if necessary, within six (6) months of the effective date of the final permit. If the permittee maintains other plans that contain duplicative information, those plans could be incorporated by reference to the SWP3. Examples of these type plans include, but are not limited to: Spill Prevention Control and Countermeasures Plan (SPCC), Best Management Plan (BMP), Response Plans, etc. The conditions will be found in the draft permit. Including Best Management Practice (BMP) controls in the form of a SWP3 is consistent with other LPDES and EPA permits regulating similar discharges of stormwater associated with industrial activity, as defined in LAC 33:IX.2511.B.14 [40 CFR 122.26(b)(14)].

# Appendix A

MEMORANDUM

TO: Gene Jarreau

FROM: Todd Franklin

DATE: January 22, 2009

RE: Stream Flow and Water Quality Characteristics for the Mermentau River, receiving waters for Verenium Biofuels Louisiana, LLC
LA0051799 / AI 3245

Determination of the water quality characteristics for Outfall 001 were taken from ambient site number 3 (Mermentau River at the bridge on US Highway 190 between Mermentau and Silverwood, Louisiana). The following hardness and TSS data was obtained:

| | | |
|---|---|---|
| Average hardness | = | 45.7 mg/l |
| $15^{th}$ percentile TSS | = | 8.5 mg/l |

Based on the *Total Maximum Daily Load (TMDL) for the Pesticide Fipronil in the Mermentau River Basin*, the 7Q10 of the Mermentau River above Lake Arthur was determined to be 68.52 cfs. Therefore, this flow may be used for limits calculations.

If you have additional questions or comments, please contact me at 2-3102.

# Appendix B

wqsmodn.wk4 Date: 01/27 Appendix B-1 Page 1
Developer: Bruce Fielding Time: 10:25 AM
Software: Lotus 4.0 LA0051799, AI3245
Revision date: 08/07/08

Water Quality Screen for Verenium Biofuels Louisiana, LLC

Input variables:

Receiving Water Characteristics:

| | |
|---|---|
| Receiving Water Name= | Mermentau River |
| Critical flow (Qr) cfs= | 68.52 |
| Harm. mean/avg tidal cfs= | |
| Drinking Water=1 HHNPCR=2 | 1 |
| MW=1, BW=2, 0=n | |
| Rec. Water Hardness= | 45.7 |
| Rec. Water TSS= | 8.5 |
| Fisch/Specific=1,Stream=0 | |
| Diffuser Ratio= | |

Effluent Characteristics:

| | |
|---|---|
| Permittee= | Verenium Biofuels Louisiana, LLC |
| Permit Number= | LA0051799, AI3245 |
| Facility flow (Qef),MGD= | 1.04 |
| Outfall Number = | 001 |
| Eff. data, 2=lbs/day | |
| MQL, 2=lbs/day | 1 |
| Effluent Hardness= | N/A |
| Effluent TSS= | N/A |
| WQBL ind. 0=y, 1=n | |
| Acute/Chr. ratio 0=n, 1=y | 1 |
| Aquatic,acute only1=y,0=n | |
| Page Numbering/Labeling | |
| Appendix | Appendix B-1 |
| Page Numbers 1=y, 0=n | 1 |
| Input Page # 1=y, 0=n | 1 |
| Fischer/Site Specific inputs: | |
| Pipe=1,Canal=2,Specific=3 | |
| Pipe width, feet | |
| ZID plume dist., feet | |
| MZ plume dist., feet | |
| HHnc plume dist., feet | |
| HHc plume dist., feet | |
| Fischer/site specific dilutions: | |
| F/specific ZID Dilution = | --- |
| F/specific MZ Dilution = | --- |
| F/specific HHnc Dilution= | --- |
| F/specific HHc Dilution= | --- |

Dilution:

| | |
|---|---|
| ZID Fs = | 0.1 |
| MZ Fs = | 1 |
| Critical Qr (MGD)= | 44.28448 |
| Harm. Mean (MGD)= | 44.28448 |
| ZID Dilution = | 0.190182 |
| MZ Dilution = | 0.022946 |
| HHnc Dilution= | 0.022946 |
| HHc Dilution= | 0.022946 |
| ZID Upstream = | 4.258123 |
| MZ Upstream = | 42.58123 |
| MZhhnc Upstream= | 42.58123 |
| MZhhc Upstream= | 42.58123 |
| ZID Hardness= | --- |
| MZ Hardness= | --- |
| ZID TSS= | --- |
| MZ TSS= | --- |

Multipliers:

| | |
|---|---|
| WLAa --> LTAa | 0.32 |
| WLAc --> LTAc | 0.53 |
| LTA a,c-->WQBL avg | 1.31 |
| LTA a,c-->WQBL max | 3.11 |
| LTA h --> WQBL max | 2.38 |
| WQBL-limit/report | 2.13 |
| WLA Fraction | 1 |
| WQBL Fraction | 1 |

Conversions:

| | |
|---|---|
| ug/L-->lbs/day Qef | 0.008674 |
| ug/L-->lbs/day Qeo | 0 |
| ug/L-->lbs/day Qr | 0.571457 |
| lbs/day-->ug/L Qeo1 | 115.2924 |
| lbs/day-->ug/L Qef1 | 115.2924 |
| diss-->tot 1=y0=n | 1 |
| Cu diss->tot1=y0=n | 1 |
| cfs-->MGD | 0.6463 |

Receiving Stream:

| | |
|---|---|
| Default Hardness= | 25 |
| Default TSS= | 10 |
| 99 Crit., 1=y, 0=n | 1 |

Toxicity Dilution Series:

| | |
|---|---|
| Biomonitoring dilution: | 0.229457 |
| Dilution Series Factor: | 0.75 |

| | Percent Effluent |
|---|---|
| Dilution No. 1 | 30.594% |
| Dilution No. 2 | 22.9457% |
| Dilution No. 3 | 17.2092% |
| Dilution No. 4 | 12.9069% |
| Dilution No. 5 | 9.6802% |

Partition Coefficients; Dissolved-->Total

| METALS | FW |
|---|---|
| Total Arsenic | 1.85543 |
| Total Cadmium | 4.028555 |
| Chromium III | 4.903 |
| Chromium VI | 1 |
| Total Copper | 2.814188 |
| Total Lead | 5.295778 |
| Total Mercury | 3.149212 |
| Total Nickel | 2.229833 |
| Total Zinc | 3.375394 |

Aquatic Life, Dissolved
Metal Criteria, ug/L

| METALS | ACUTE | CHRONIC |
|---|---|---|
| Arsenic | 339.8 | 150 |
| Cadmium | 13.60471 | 0.577591 |
| Chromium III | 288.9592 | 93.73537 |
| Chromium VI | 15.712 | 10.582 |
| Copper | 8.810631 | 6.291258 |
| Lead | 27.27106 | 1.062714 |
| Mercury | 1.734 | 0.012 |
| Nickel | 729.7435 | 81.04387 |
| Zinc | 58.94579 | 53.82645 |

Site Specific Multiplier Values:

| | |
|---|---|
| CV = | --- |
| N = | --- |
| WLAa --> LTAa | --- |
| WLAc --> LTAc | --- |
| LTA a,c-->WQBL avg | --- |
| LTA a,c-->WQBL max | --- |
| LTA h --> WQBL max | --- |

Appendix B-1
Verenium Biofuels Louisiana, LLC
LA0051799, AI3245



| (*1) | (*2) | (*3) | (*4) | (*5) | (*6) | (*7) | (*8) | (*9) | (*10) | (*11) |
|---|---|---|---|---|---|---|---|---|---|---|
| Toxic Parameters | Instream Conc. ug/L | CuEffluent /Tech (Avg) ug/L | Effluent /Tech (Max) ug/L | MQL ug/L | Effluent 1=No 0=95 % | 95th % estimate Non-Tech ug/L | Numerical Criteria Acute FW ug/L | Chronic FW ug/L | HHDW ug/L | HH Carcinogen Indicator "C" |
| NONCONVENTIONAL | | | | | | | | | | |
| Total Phenols (4AAP) | | 39 | | 5 | 0 | 83.07 | 700 | 350 | 5 | |
| 3-Chlorophenol | | | | 10 | | | | | 0.1 | |
| 4-Chlorophenol | | | | 10 | | | 383 | 192 | 0.1 | |
| 2,3-Dichlorophenol | | | | 10 | | | | | 0.04 | |
| 2,5-Dichlorophenol | | | | 10 | | | | | 0.5 | |
| 2,6-Dichlorophenol | | | | 10 | | | | | 0.2 | |
| 3,4-Dichlorophenol | | | | 10 | | | | | 0.3 | |
| 2,4-Dichlorophenocy-acetic acid (2,4-D) | | | | --- | | | | | 100 | |
| 2-(2,4,5-Trichlorophen-oxy) propionic acid (2,4,5-TP, Silvex) | | | | --- | | | | | 10 | |
| METALS AND CYANIDE | | | | | | | | | | |
| Total Arsenic | | | | 10 | | | 630.475 | 278.3145 | 92.77149 | |
| Total Cadmium | | 2 | | 1 | 0 | 4.26 | 54.80731 | 2.326856 | 40.28555 | |
| Chromium III | | | | 10 | | | 1416.767 | 459.5846 | 245.15 | |
| Chromium VI | | | | 10 | | | 15.712 | 10.582 | 50 | C |
| Total Copper | | | | 10 | | | 24.79477 | 17.70478 | 2814.188 | |
| Total Lead | | | | 5 | | | 144.4215 | 5.627898 | 264.7889 | |
| Total Mercury | | | | 0.2 | | | 5.460734 | 0.037791 | 6.298425 | |
| Total Nickel | | | | 40 | | | 1627.206 | 180.7143 | | |
| Total Zinc | | | | 20 | | | 198.9653 | 181.6855 | 16876.97 | |
| Total Cyanide | | | | 20 | | | 45.9 | 5.4 | 663.8 | |
| DIOXIN | | | | | | | | | | |
| 2,3,7,8 TCDD; dioxin | | | 1.0E-005 | | | | | | 7.1E-007 | C |
| VOLATILE COMPOUNDS | | | | | | | | | | |
| Benzene | | | | 10 | | | 2249 | 1125 | 1.1 | C |
| Bromoform | | | | 10 | | | 2930 | 1465 | 3.9 | C |
| Bromodichloromethane | | | | 10 | | | | | 0.2 | C |
| Carbon Tetrachloride | | | | 10 | | | 2730 | 1365 | 0.22 | C |
| Chloroform | | | | 10 | | | 2890 | 1445 | 5.3 | C |
| Dibromochloromethane | | | | 10 | | | | | 0.39 | C |
| 1,2-Dichloroethane | | | | 10 | | | 11800 | 5900 | 0.36 | C |
| 1,1-Dichloroethylene | | | | 10 | | | 1160 | 580 | 0.05 | C |
| 1,3-Dichloropropylene | | | | 10 | | | 606 | 303 | 9.86 | |
| Ethylbenzene | | | | 10 | | | 3200 | 1600 | 2390 | |
| Methyl Chloride | | | | 50 | | | 55000 | 27500 | | |
| Methylene Chloride | | | | 20 | | | 19300 | 9650 | 4.4 | C |
| 1,1,2,2-Tetrachloro-ethane | | | | 10 | | | 932 | 466 | 0.16 | C |

| (*1) Toxic Parameters | (*12) WLAa Acute | (*13) WLAc Chronic | (*14) WLAh HHDW | (*15) LTAa Acute | (*16) LTAc Chronic | (*17) LTAh HHDW | (*18) Limiting A,C,HH | (*19) WQBL Avg 001 | (*20) WQBL Max 001 | (*21) WQBL Avg 001 | (*22) WQBL Max 001 | (*23) Need WQBL? |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | lbs/day | lbs/day | |
| NONCONVENTIONAL | | | | | | | | | | | | |
| Total Phenols (4AAP) | 3680.686 | 15253.43 | 217.9061 | 1177.819 | 8084.318 | 217.9061 | 217.9061 | 217.9061 | 518.6166 | 1.890031 | 4.498273 | no |
| 3-Chlorophenol | --- | --- | 4.358123 | --- | --- | 4.358123 | 4.358123 | 4.358123 | 10.37233 | 0.037801 | 0.089965 | no |
| 4-Chlorophenol | 2013.861 | 8367.596 | 4.358123 | 644.4355 | 4434.826 | 4.358123 | 4.358123 | 4.358123 | 10.37233 | 0.037801 | 0.089965 | no |
| 2,3-Dichlorophenol | --- | --- | 1.743249 | --- | --- | 1.743249 | 1.743249 | 1.743249 | 4.148933 | 0.01512 | 0.035986 | no |
| 2,5-Dichlorophenol | --- | --- | 21.79061 | --- | --- | 21.79061 | 21.79061 | 21.79061 | 51.86166 | 0.189003 | 0.449827 | no |
| 2,6-Dichlorophenol | --- | --- | 8.716245 | --- | --- | 8.716245 | 8.716245 | 8.716245 | 20.74466 | 0.075601 | 0.179931 | no |
| 3,4-Dichlorophenol | --- | --- | 13.07437 | --- | --- | 13.07437 | 13.07437 | 13.07437 | 31.117 | 0.113402 | 0.269896 | no |
| 2,4-Dichlorophenocy-acetic acid (2,4-D) | --- | --- | 4358.123 | --- | --- | 4358.123 | 4358.123 | 4358.123 | 10372.33 | 37.80061 | 89.96546 | no |
| 2-(2,4,5-Trichlorophen-oxy) propionic acid (2,4,5-TP, Silvex) | --- | --- | 435.8123 | --- | --- | 435.8123 | 435.8123 | 435.8123 | 1037.233 | 3.780061 | 8.996546 | no |
| METALS AND CYANIDE | | | | | | | | | | | | |
| Total Arsenic | 3315.115 | 12129.29 | 4043.095 | 1060.837 | 6428.521 | 4043.095 | 1060.837 | 1389.696 | 3299.202 | 12.05367 | 28.61596 | no |
| Total Cadmium | 288.1836 | 101.4072 | 1755.694 | 92.21874 | 53.74583 | 1755.694 | 53.74583 | 70.40704 | 167.1495 | 0.610682 | 1.449788 | no |
| Chromium III | 7449.535 | 20029.26 | 10683.94 | 2383.851 | 10615.51 | 10683.94 | 2383.851 | 3122.845 | 7413.777 | 27.08631 | 64.30414 | no |
| Chromium VI | 82.61562 | 461.1765 | 2179.061 | 26.437 | 244.4236 | 2179.061 | 26.437 | 34.63247 | 82.21907 | 0.300388 | 0.713135 | no |
| Total Copper | 130.3739 | 771.5961 | 122645.8 | 41.71966 | 408.9459 | 122645.8 | 41.71966 | 54.65276 | 129.7481 | 0.474036 | 1.125384 | no |
| Total Lead | 759.3859 | 245.2707 | 11539.82 | 243.0035 | 129.9935 | 11539.82 | 129.9935 | 170.2915 | 404.2797 | 1.47704 | 3.50656 | no |
| Total Mercury | 28.71321 | 1.646959 | 274.4931 | 9.188228 | 0.872888 | 274.4931 | 0.872888 | 1.143483 | 2.714682 | 0.009918 | 0.023546 | no |
| Total Nickel | 8556.051 | 7875.752 | --- | 2737.936 | 4174.148 | --- | 2737.936 | 3586.697 | 8514.982 | 31.10957 | 73.85555 | no |
| Total Zinc | 1046.184 | 7918.076 | 735519.1 | 334.7789 | 4196.58 | 735519.1 | 334.7789 | 438.5603 | 1041.162 | 3.803897 | 9.030625 | no |
| Total Cyanide | 241.3478 | 235.3386 | 28929.22 | 77.23131 | 124.7295 | 28929.22 | 77.23131 | 101.173 | 240.1894 | 0.877534 | 2.083306 | no |
| DIOXIN | | | | | | | | | | | | |
| 2,3,7,8 TCDD; dioxin | --- | --- | 0.000031 | --- | --- | 0.000031 | 0.000031 | 0.000031 | 0.000074 | 2.7E-007 | 6.4E-007 | no |
| VOLATILE COMPOUNDS | | | | | | | | | | | | |
| Benzene | 11825.52 | 49028.88 | 47.93935 | 3784.166 | 25985.31 | 47.93935 | 47.93935 | 47.93935 | 114.0957 | 0.415807 | 0.98962 | no |
| Bromoform | 15406.3 | 63846.5 | 169.9668 | 4930.016 | 33838.64 | 169.9668 | 169.9668 | 169.9668 | 404.5209 | 1.474224 | 3.508653 | no |
| Bromodichloromethane | --- | --- | 8.716245 | --- | --- | 8.716245 | 8.716245 | 8.716245 | 20.74466 | 0.075601 | 0.179931 | no |
| Carbon Tetrachloride | 14354.67 | 59488.37 | 9.58787 | 4593.496 | 31528.84 | 9.58787 | 9.58787 | 9.58787 | 22.81913 | 0.083161 | 0.197924 | no |
| Chloroform | 15195.97 | 62974.87 | 230.9805 | 4862.712 | 33376.68 | 230.9805 | 230.9805 | 230.9805 | 549.7336 | 2.003432 | 4.768169 | no |
| Dibromochloromethane | --- | --- | 16.99668 | --- | --- | 16.99668 | 16.99668 | 16.99668 | 40.45209 | 0.147422 | 0.350865 | no |
| 1,2-Dichloroethane | 62045.85 | 257129.2 | 15.68924 | 19854.67 | 136278.5 | 15.68924 | 15.68924 | 15.68924 | 37.3404 | 0.136082 | 0.323876 | no |
| 1,1-Dichloroethylene | 6099.422 | 25277.11 | 2.179061 | 1951.815 | 13396.87 | 2.179061 | 2.179061 | 2.179061 | 5.186166 | 0.0189 | 0.044983 | no |
| 1,3-Dichloropropylene | 3186.422 | 13205.11 | 429.7109 | 1019.655 | 6998.709 | 429.7109 | 429.7109 | 429.7109 | 1022.712 | 3.72714 | 8.870594 | no |
| Ethylbenzene | 16825.99 | 69729.96 | 104159.1 | 5384.318 | 36956.88 | 104159.1 | 5384.318 | 7053.456 | 16745.23 | 61.17886 | 145.2414 | no |
| Methyl Chloride | 289196.7 | 1198484 | --- | 92542.96 | 635196.4 | --- | 92542.96 | 121231.3 | 287808.6 | 1051.512 | 2496.337 | no |
| Methylene Chloride | 101481.8 | 420558.8 | 191.7574 | 32474.17 | 222896.2 | 191.7574 | 191.7574 | 191.7574 | 456.3826 | 1.663227 | 3.95848 | no |
| 1,1,2,2-Tetrachloro-ethane | 4900.57 | 20308.85 | 6.972996 | 1568.183 | 10763.69 | 6.972996 | 6.972996 | 6.972996 | 16.59573 | 0.060481 | 0.143945 | no |

| (*1) Toxic Parameters | (*2) Instream Conc. ug/L | (*3) CuEffluent /Tech (Avg) ug/L | (*4) Effluent /Tech (Max) ug/L | (*5) MQL ug/L | (*6) Effluent 1=No 0=95 % | (*7) 95th % estimate Non-Tech ug/L | (*8) Numerical Criteria Acute FW ug/L | (*9) Chronic FW ug/L | (*10) HHDW ug/L | (*11) HH Carcinogen Indicator "C" |
|---|---|---|---|---|---|---|---|---|---|---|
| VOLATILE COMPOUNDS (cont'd) | | | | | | | | | | |
| Tetrachloroethylene | | | | 10 | | | 1290 | 645 | 0.65 | C |
| Toluene | | | | 10 | | | 1270 | 635 | 6100 | |
| 1,1,1-Trichloroethane | | | | 10 | | | 5280 | 2640 | 200 | |
| 1,1,2-Trichloroethane | | | | 10 | | | 1800 | 900 | 0.56 | C |
| Trichloroethylene | | | | 10 | | | 3900 | 1950 | 2.8 | C |
| Vinyl Chloride | | | | 10 | | | | | 1.9 | C |
| ACID COMPOUNDS | | | | | | | | | | |
| 2-Chlorophenol | | | | 10 | | | 258 | 129 | 0.1 | |
| 2,4-Dichlorophenol | | | | 10 | | | 202 | 101 | 0.3 | |
| BASE NEUTRAL COMPOUNDS | | | | | | | | | | |
| Benzidine | | | | 50 | | | 250 | 125 | 0.00008 | C |
| Hexachlorobenzene | | | | 10 | | | | | 0.00025 | C |
| Hexachlorabutadiene | | | | 10 | | | 5.1 | 1.02 | 0.09 | C |
| PESTICIDES | | | | | | | | | | |
| Aldrin | | | | 0.05 | | | 3 | | 0.00004 | C |
| Hexachlorocyclohexane (gamma BHC, Lindane) | | | | 0.05 | | | 5.3 | 0.21 | 0.11 | C |
| Chlordane | | | | 0.2 | | | 2.4 | 0.0043 | 0.00019 | C |
| 4,4'-DDT | | | | 0.1 | | | 1.1 | 0.001 | 0.00019 | C |
| 4,4'-DDE | | | | 0.1 | | | 52.5 | 10.5 | 0.00019 | C |
| 4,4'-DDD | | | | 0.1 | | | 0.03 | 0.006 | 0.00027 | C |
| Dieldrin | | | | 0.1 | | | 0.2374 | 0.0557 | 0.00005 | C |
| Endosulfan | | | | 0.1 | | | 0.22 | 0.056 | 0.47 | |
| Endrin | | | | 0.1 | | | 0.0864 | 0.0375 | 0.26 | |
| Heptachlor | | | | 0.05 | | | 0.52 | 0.0038 | 0.00007 | C |
| Toxaphene | | | | 5 | | | 2<br>0.73 | 0.014<br>0.0002 | 0.00024 | C |
| Other Parameters: | | | | | | | | | | |
| Fecal Col.(col/100ml) | | | | | | | | | | |
| Chlorine | | | | | | | 19 | 11 | | |
| Ammonia | | 81600 | | | 0 | 173808 | | | | |
| Chlorides | | | | | | | | | | |
| Sulfates | | | | | | | | | | |
| TDS | | | | | | | | | | |

Appendix B-1
Verenium Biofuels Louisiana, LLC
LA0051799, AI3245



| (*1) Toxic Parameters | (*12) WLAa Acute | (*13) WLAc Chronic | (*14) WLAh HHDW | (*15) LTAa Acute | (*16) LTAc Chronic | (*17) LTAh HHDW | (*18) Limiting A,C,HH | (*19) WQBL Avg 001 | (*20) WQBL Max 001 | (*21) WQBL Avg 001 | (*22) WQBL MaxWQBL? 001 | (*23) Need |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | lbs/day | lbs/day | |
| Tetrachloroethylene | 6782.978 | 28109.89 | 28.3278 | 2170.553 | 14898.24 | 28.3278 | 28.3278 | 28.3278 | 67.42016 | 0.245704 | 0.584775 | no |
| Toluene | 6677.816 | 27674.08 | 265845.5 | 2136.901 | 14667.26 | 265845.5 | 2136.901 | 2799.34 | 6645.762 | 24.28036 | 57.64268 | no |
| 1,1,1-Trichloroethane | 27762.89 | 115054.4 | 8716.245 | 8884.124 | 60978.85 | 8716.245 | 8716.245 | 8716.245 | 20744.66 | 75.60123 | 179.9309 | no |
| 1,1,2-Trichloroethane | 9464.621 | 39223.1 | 24.40549 | 3028.679 | 20788.25 | 24.40549 | 24.40549 | 24.40549 | 58.08506 | 0.211683 | 0.503807 | no |
| Trichloroethylene | 20506.68 | 84983.39 | 122.0274 | 6562.137 | 45041.2 | 122.0274 | 122.0274 | 122.0274 | 290.4253 | 1.058417 | 2.519033 | no |
| Vinyl Chloride | --- | --- | 82.80433 | --- | --- | 82.80433 | 82.80433 | 82.80433 | 197.0743 | 0.718212 | 1.709344 | no |
| ACID COMPOUNDS | | | | | | | | | | | | |
| 2-Chlorophenol | 1356.596 | 5621.978 | 4.358123 | 434.1106 | 2979.648 | 4.358123 | 4.358123 | 4.358123 | 10.37233 | 0.037801 | 0.089965 | no |
| 2,4-Dichlorophenol | 1062.141 | 4401.704 | 13.07437 | 339.8851 | 2332.903 | 13.07437 | 13.07437 | 13.07437 | 31.117 | 0.113402 | 0.269896 | no |
| BASE NEUTRAL COMPOUNDS | | | | | | | | | | | | |
| Benzidine | 1314.531 | 5447.653 | 0.003486 | 420.6498 | 2887.256 | 0.003486 | 0.003486 | 0.003486 | 0.008298 | 0.00003 | 0.000072 | no |
| Hexachlorobenzene | --- | --- | 0.010895 | --- | --- | 0.010895 | 0.010895 | 0.010895 | 0.025931 | 0.000095 | 0.000225 | no |
| Hexachlorabutadiene | 26.81643 | 44.45285 | 3.92231 | 8.581256 | 23.56001 | 3.92231 | 3.92231 | 3.92231 | 9.335099 | 0.034021 | 0.080969 | no |
| PESTICIDES | | | | | | | | | | | | |
| Aldrin | 15.77437 | --- | 0.001743 | 5.047798 | --- | 0.001743 | 0.001743 | 0.001743 | 0.004149 | 0.000015 | 0.000036 | no |
| Hexachlorocyclohexane (gamma BHC, Lindane) | 27.86805 | 9.152058 | 4.793935 | 8.917776 | 4.850591 | 4.793935 | 4.793935 | 4.793935 | 11.40957 | 0.041581 | 0.098962 | no |
| Chlordane | 12.61949 | 0.187399 | 0.00828 | 4.038238 | 0.099322 | 0.00828 | 0.00828 | 0.00828 | 0.019707 | 0.000072 | 0.000171 | no |
| 4,4'-DDT | 5.783935 | 0.043581 | 0.00828 | 1.850859 | 0.023098 | 0.00828 | 0.00828 | 0.00828 | 0.019707 | 0.000072 | 0.000171 | no |
| 4,4'-DDE | 276.0514 | 457.6029 | 0.00828 | 88.33646 | 242.5295 | 0.00828 | 0.00828 | 0.00828 | 0.019707 | 0.000072 | 0.000171 | no |
| 4,4'-DDD | 0.157744 | 0.261487 | 0.011767 | 0.050478 | 0.138588 | 0.011767 | 0.011767 | 0.011767 | 0.028005 | 0.000102 | 0.000243 | no |
| Dieldrin | 1.248278 | 2.427474 | 0.002179 | 0.399449 | 1.286561 | 0.002179 | 0.002179 | 0.002179 | 0.005186 | 0.000019 | 0.000045 | no |
| Endosulfan | 1.156787 | 2.440549 | 20.48318 | 0.370172 | 1.293491 | 20.48318 | 0.370172 | 0.484925 | 1.151234 | 0.004206 | 0.009985 | no |
| Endrin | 0.454302 | 1.634296 | 11.33112 | 0.145377 | 0.866177 | 11.33112 | 0.145377 | 0.190443 | 0.452121 | 0.001652 | 0.003922 | no |
| Heptachlor | 2.734224 | 0.165609 | 0.003051 | 0.874952 | 0.087773 | 0.003051 | 0.003051 | 0.003051 | 0.007261 | 0.000026 | 0.000063 | no |
| Toxaphene | 3.83843 | 0.008716 | 0.010459 | 1.228297 | 0.00462 | 0.010459 | 0.00462 | 0.006052 | 0.014367 | 0.000052 | 0.000125 | no |
| Other Parameters: | | | | | | | | | | | | |
| Fecal Col.(col/100ml) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | no |
| Chlorine | 99.90433 | 479.3935 | --- | 31.96939 | 254.0786 | --- | 31.96939 | 41.8799 | 99.42479 | 0.363249 | 0.862371 | no |
| Ammonia | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | no |
| Chlorides | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | no |
| Sulfates | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | no |
| TDS | --- | --- | -- | | --- | --- | --- | --- | --- | --- | --- | no |
| | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | no |
| | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | no |

APPENDIX B-2 LA0051799, AI No. 3245

Documentation and Explanation of Water Quality Screen
and Associated Lotus Spreadsheet

Each reference column is marked by a set of parentheses enclosing a number and asterisk, for example (*1) or (*19). These columns represent inputs, existing data sets, calculation points, and results for determining Water Quality Based Limits for an effluent of concern. The following represents a summary of information used in calculating the water quality screen:

Receiving Water Characteristics:

Receiving Water: Mermentau River
Critical Flow, Qrc (cfs): 68.52
Harmonic Mean Flow, Qrh (cfs):
Segment No.: 050401
Receiving Stream Hardness (mg/L): 45.7
Receiving Stream TSS (mg/L): 8.5
MZ Stream Factor, Fs: 1
Plume distance, Pf: N/A

Effluent Characteristics:

Company: Verenium Biofuels Louisiana, LLC
Facility flow, Qe (MGD): 1.04
Effluent Hardness: N/A
Effluent TSS: N/A
Pipe/canal width, Pw: N/A
Permit Number: LA0051799

Variable Definition:
Qrc, critical flow of receiving stream, cfs
Qrh, harmonic mean flow of the receiving stream, cfs
Pf = Allowable plume distance in feet, specified in LAC 33.IX.1115.D
Pw = Pipe width or canal width in feet
Qe, total facility flow , MGD
Fs, stream factor from LAC.IX.33.11 (1 for harmonic mean flow)
Cu, ambient concentration, ug/L
Cr, numerical criteria from LAC.IX.1113, Table 1
WLA, wasteload allocation
LTA, long term average calculations
WQBL, effluent water quality based limit
ZID, Zone of Initial Dilution in % effluent
MZ, Mixing Zone in % effluent

Formulas used in aquatic life water quality screen (dilution type WLA):

Streams:

$$\text{Dilution Factor} = \frac{Qe}{(Qrc \times 0.6463 \times Fs + Qe)}$$

$$WLA\ a,c,h = \frac{Cr}{\text{Dilution Factor}} - \frac{(Fs \times Qrc \times 0.6463 \times Cu)}{Qe}$$

Static water bodies (in the absence of a site specific dilution):

Discharge from a pipe:

$$\text{Critical Dilution} = \frac{(2.8)\ Pw\ \pi^{1/2}}{Pf}$$

$$WLA = \frac{(Cr-Cu)\ Pf}{(2.8)\ Pw\ \pi^{1/2}}$$

Discharge from a canal:

$$\text{Critical Dilution} = \frac{(2.38)(Pw^{1/2})}{(Pf)^{1/2}}$$

$$WLA = \frac{(Cr-Cu)\ Pf^{1/2}}{2.38\ Pw^{1/2}}$$

Formulas used in human health water quality screen, human health non-carcinogens (dilution type WLA):

Streams:

$$\text{Dilution Factor} = \frac{Qe}{(Qrc \times 0.6463 + Qe)}$$

$$WLA\ a,c,h = \frac{Cr}{\text{Dilution Factor}} - \frac{(Qrc \times 0.6463 \times Cu)}{Qe}$$

Formulas used in human health water quality screen, human health carcinogens (dilution type WLA):

$$\text{Dilution Factor} = \frac{Qe}{(Qrh \times 0.6463 + Qe)}$$

$$WLA\ a,c,h = \frac{Cr}{\text{Dilution Factor}} - \frac{(Qrh \times 0.6463 \times Cu)}{Qe}$$

Static water bodies in the absence of a site specific dilution (human health carcinogens and human health non-carcinogens):

Discharge from a pipe:

$$\text{Critical Dilution} = \frac{(2.8)\ Pw\ \pi^{1/2}}{Pf}$$

$$WLA = \frac{(Cr-Cu)\ Pf^{*}}{(2.8)\ Pw\ \pi^{1/2}}$$

Discharge from a canal:

$$\text{Critical Dilution} = \frac{(2.38)(Pw^{1/2})}{(Pf)^{1/2}}$$

$$WLA = \frac{(Cr-Cu)\ Pf^{1/2*}}{2.38\ Pw^{1/2}}$$

* Pf is set equal to the mixing zone distance specified in LAC 33:IX.1115 for the static water body type, i.e., lake, estuary, Gulf of Mexico, etc.

If a site specific dilution is used, WLA are calculated by subtracting Cu from Cr and dividing by the site specific dilution for human health and aquatic life criteria.

$$WLA = \frac{(Cr-Cu)}{\text{site specific dilution}}$$

Longterm Average Calculations:
LTAa = WLAa X 0.32
LTAc = WLAc X 0.53
LTAh = WLAh

WQBL Calculations:
Select most limiting LTA to calculate daily max and monthly avg WQBL

If aquatic life LTA is more limiting:
Daily Maximum = Min(LTAa, LTAc) X 3.11
Monthly Average = Min(LTAc, LTAc) X 1.31

If human health LTA is more limiting:
Daily Maximum = LTAh X 2.38
Monthly Average = LTAh

Mass Balance Formulas:

mass (lbs/day): (ug/L) X 1/1000 X (flow, MGD) X 8.34 = lbs/day

$$\text{concentration(ug/L)}: \frac{\text{lbs/day}}{\text{(flow, MGD) X 8.34 X 1/1000}} = \text{ug/L}$$

The following is an explanation of the references in the spreadsheet.

(*1) Parameter being screened.
(*2) Instream concentration for the parameter being screened in ug/L. In the absence of accurate supporting data, the instream concentration is assumed to be zero (0).
(*3) Monthly average effluent or technolgy value in concentration units of ug/L or mass units of lbs/day. Units determined on a case-by-case basis as appropriate to the particular situation.
(*4) Daily maximum technology value in concentration units of ug/L or mass units of lbs/day. Units determined on a case-by-case basis as appropriate to the particular situation.
(*5) Minimum analytical Quantification Levels (MQL's). Established in a letter dated January 27, 1994 from Wren Stenger of EPA Region 6 to Kilren Vidrine of LDEQ and from the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards". The applicant must test for the parameter at a level at least as sensitive as the specified MQL. If this is not done, the MQL becomes the application value for screening purposes if the pollutant is suspected to be present

on-site and/or in the waste stream. Units are in ug/l or lbs/day depending on the units of the effluent data.

(*6) States whether effluent data is based on 95th percentile estimation. A "1" indicates that a 95th percentile approximation is being used, a "0" indicates that no 95th percentile approximation is being used.

(*7) 95th percentile approximation multiplier (2.13). The constant, 2.13, was established in memorandum of understanding dated October 8, 1991 from Jack Ferguson of Region 6 to Jesse Chang of LDEQ and included in the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards". This value is screened against effluent Water Quality Based Limits established in columns (*18) - (*21). Units are in ug/l or lbs/day depending on the units of the measured effluent data.

(*8) LAC 33.IX.1113.C.6, Table 1, Numerical Criteria for Specific Toxic Substances, freshwater (FW) or marine water (MW) (whichever is applicable) aquatic life protection, acute criteria. Units are specified. Some metals are hardness dependent. The hardness of the receiving stream shall generally be used, however a flow weighted hardness may be determined in site-specific situations. Dissolved metals are converted to Total metals using partition coefficients in accordance with the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards". Similar to hardness, the TSS of the receiving stream shall generally be used, however, a flow weighted TSS may be determined in site-specific situations.

Hardness Dependent Criteria:

| Metal | Formula |
|---|---|
| Cadmium | $e^{(1.1280[\ln(\text{hardness})] - 1.6774)}$ |
| Chromium III | $e^{(0.8190[\ln(\text{hardness})] + 3.6880)}$ |
| Copper | $e^{(0.9422[\ln(\text{hardness})] - 1.3884)}$ |
| Lead | $e^{(1.2730[\ln(\text{hardness})] - 1.4600)}$ |
| Nickel | $e^{(0.8460[\ln(\text{hardness})] + 3.3612)}$ |
| Zinc | $e^{(0.8473[\ln(\text{hardness})] + 0.8604)}$ |

Dissolved to Total Metal Multipliers for Freshwater Streams (TSS dependent):

| Metal | Multiplier |
|---|---|
| Arsenic | $1 + 0.48 \times TSS^{-0.73} \times TSS$ |
| Cadmium | $1 + 4.00 \times TSS^{-1.13} \times TSS$ |
| Chromium III | $1 + 3.36 \times TSS^{-0.93} \times TSS$ |
| Copper | $1 + 1.04 \times TSS^{-0.74} \times TSS$ |
| Lead | $1 + 2.80 \times TSS^{-0.80} \times TSS$ |
| Mercury | $1 + 2.90 \times TSS^{-1.14} \times TSS$ |
| Nickel | $1 + 0.49 \times TSS^{-0.57} \times TSS$ |
| Zinc | $1 + 1.25 \times TSS^{-0.70} \times TSS$ |

Dissolved to Total Metal Multipliers for Marine Environments (TSS dependent):

| Metal | Multiplier |
|---|---|

| | |
|---|---|
| Copper | $1 + (10^{4.86} \times TSS^{-0.72} \times TSS) \times 10^{-6}$ |
| Lead | $1 + (10^{6.06} \times TSS^{-0.85} \times TSS) \times 10^{-6}$ |
| Zinc | $1 + (10^{5.36} \times TSS^{-0.52} \times TSS) \times 10^{-6}$ |

If a metal does not have multiplier listed above, then the dissolved to total metal multiplier shall be 1.

(*9) LAC 33.IX.1113.C.6, Table 1, Numerical Criteria for Specific Toxic Substances, freshwater (FW) or marine water (MW) (whichever is applicable) aquatic life protection, chronic criteria. Units are specified. Some metals are hardness dependent. The hardness of the receiving stream shall generally be used, however a flow weighted hardness may be determined in site-specific situations. Dissolved metals are converted to Total metals using partition coefficients in accordance with the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards". Similar to hardness, the TSS of the receiving stream shall generally be used, however, a flow weighted TSS may be determined in site-specific situations.

Hardness dependent criteria:

| Metal | Formula |
|---|---|
| Cadmium | $e^{(0.7852[\ln(\text{hardness})] - 3.4900)}$ |
| Chromium III | $e^{(0.8473[\ln(\text{hardness})] + 0.7614)}$ |
| Copper | $e^{(0.8545[\ln(\text{hardness})] - 1.3860)}$ |
| Lead | $e^{(1.2730[\ln(\text{hardness})] - 4.7050)}$ |
| Nickel | $e^{(0.8460[\ln(\text{hardness})] + 1.1645)}$ |
| Zinc | $e^{(0.8473[\ln(\text{hardness})] + 0.7614)}$ |

Dissolved to total metal multiplier formulas are the same as (*8), acute numerical criteria for aquatic life protection.

(*10) LAC 33.IX.1113.C.6, Table 1, Numerical Criteria for Specific Toxic Substances, human health protection, drinking water supply (HHDW), non-drinking water supply criteria (HHNDW), or human health non-primary contact recreation (HHNPCR) (whichever is applicable). A DEQ and EPA approved Use Attainability Analysis is required before HHNPCR is used, e.g., Monte Sano Bayou. Units are specified.

(*11) C if screened and carcinogenic. If a parameter is being screened and is carcinogenic a "C" will appear in this column.

(*12) Wasteload Allocation for acute aquatic criteria (WLAa). Dilution type WLAa is calculated in accordance with the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards". Negative values indicate that the receiving water is not meeting the acute aquatic numerical criteria for that parameter. Units are in ug/L.

Dilution WLAa formulas for streams:

$$WLAa = (Cr/\text{Dilution Factor}) - \frac{(Fs \times Qrc \times 0.6463 \times Cu)}{Qe}$$

Dilution WLAa formulas for static water bodies:

$WLAa = (Cr-Cu)/\text{Dilution Factor})$

Cr represents aquatic acute numerical criteria from column (*8).

If Cu data is unavailable or inadequate, assume Cu=0.

If water quality standards are being applied at end-of-pipe, such as in the case of certain TMDL's, then a blank shall appear in this column.

(*13) Wasteload Allocation for chronic aquatic criteria (WLAc). Dilution type WLAc is calculated in accordance with the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards". Negative values indicate that the receiving water is not meeting the chronic aquatic numerical criteria for that parameter. Units are in ug/L.
Dilution WLAc formula:

$$WLAc = (Cr/\text{Dilution Factor}) - \frac{(Fs \times Orc \times 0.6463 \times Cu)}{Qe}$$

Dilution WLAc formulas for static water bodies:
WLAc = (Cr-Cu)/Dilution Factor)
Cr represents aquatic chronic numerical criteria from column (*9).
If Cu data is unavailable or inadequate, assume Cu=0.
If water quality standards are being applied at end-of-pipe, such as in the case of certain TMDL's, then a blank shall appear in this column.

(*14) Wasteload Allocation for human health criteria (WLAh). Dilution type WLAh is calculated in accordance with the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards". Negative values indicate that the receiving water is not meeting the human health numerical criteria for that parameter. Units are in ug/L. Dilution WLAh formula:

$$WLAh = (Cr/\text{Dilution Factor}) - \frac{(Fs \times Orc,Orh \times 0.6463 \times Cu)}{Qe}$$

Dilution WLAh formulas for static water bodies:
WLAh = (Cr-Cu)/Dilution Factor)
Cr represents human health numerical criteria from column (*10).
If Cu data is unavailable or inadequate, assume Cu=0.
If water quality standards are being applied at end-of-pipe, such as in the case of certain TMDL's, then a blank shall appear in this column.

(*15) Long Term Average for aquatic numerical criteria (LTAa). WLAa numbers are multiplied by a multiplier specified in the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards" which is 0.32. WLAa X 0.32 = LTAa.
If water quality standards are being applied at end-of-pipe, such as in the case of certain TMDL's, then a blank shall appear in this column.

(*16) Long Term Average for chronic numerical criteria (LTAc). WLAc numbers are multiplied by a multiplier specified in the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards" which is 0.53. WLAc X 0.53 = LTAc.
If water quality standards are being applied at end-of-pipe, such as in the case of certain TMDL's, then a blank shall appear in this column.

(*17) Long Term Average for human health numerical criteria (LTAh). WLAh numbers are multiplied by a multiplier specified in the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards" which is 1. WLAc X 1 = LTAh.
If water quality standards are being applied at end-of-pipe, such as in the case of certain TMDL's, then a blank shall appear in this column.

(*18) Limiting Acute, Chronic or Human Health LTA's. The most limiting LTA is placed in this column. Units are consistent with the WLA calculation. If standards are being applied at end-of-pipe, such as in the case of certain TMDL's, then the type of limit, Aquatic or Human Health (HH), is indicated.

(*19) End of pipe Water Quality Based Limit (WQBL) monthly average in terms of concentration, ug/L. If aquatic life criteria was the most limiting LTA then the limiting LTA is multiplied by 1.31 to determine the average WQBL ($LTA_{limiting\ aquatic}$ X 1.31 = $WQBL_{monthly\ average}$). If human health criteria was the most limiting criteria then LTAh = $WQBL_{monthly\ average}$. If water quality standards are being applied at end-of-pipe, such as in the case of certain TMDL's, then either the human health criteria or the chronic aquatic life criteria shall appear in this column depending on which is more limiting.

(*20) End of pipe Water Quality Based Limit (WQBL) daily maxium in terms of concentration, ug/L. If aquatic life criteria was the most limiting LTA then the limiting LTA is multiplied by 3.11 to determine the daily maximum WQBL ($LTA_{limiting\ aquatic}$ X 3.11 = $WQBL_{daily\ max}$). If human health criteria was the most limiting criteria then LTAh is multiplied by 2.38 to determine the daily maximum WQBL ($LTA_{limiting\ aquatic}$ X 2.38 = $WQBL_{daily\ max}$). If water quality standards are being applied at end-of-pipe, such as in the case of certain TMDL's, then either the human health criteria or the acute aquatic life criteria shall appear in this column depending on which is more limiting.

(*21) End of pipe Water Quality Based Limit (WQBL) monthly average in terms of mass, lbs/day. The mass limit is determined by using the mass balance equations above. Monthly average WQBL, ug/l/1000 X facility flow, MGD X 8.34 = monthly average WQBL, lbs/day.

(*22) End of pipe Water Quality Based Limit (WQBL) monthly average in terms of mass, lbs/day. Mass limit is determined by using the mass balance equations above. Daily maximum WQBL, ug/l/1000 X facility flow, MGD X 8.34 = daily maximum WQBL, lbs/day.

(*23) Indicates whether the screened effluent value(s) need water quality based limits for the parameter of concern. A "yes" indicates that a water quality based limit is needed in the permit; a "no" indicates the reverse.